CLAIMS

1.   An artificial tooth root implantation position determining instrument for determining the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition, the instrument comprising:

dentition data acquisition means for acquiring three-dimensional data relating to said dentition;

jaw bone data acquisition means for acquiring three-dimensional data relating to the jaw bone connected to said dentition;

combining means for combining the three-dimensional data relating to dentition acquired by said dentition data acquisition means and the three-dimensional data relating to the jaw bone acquired by said jaw bone data acquisition means;

artificial tooth data creating means for creating artificial tooth data indicating an artificial tooth that supplements the lost portion of said dentition indicated by the combined data for dentition and jaw bone created by said combining means;

candidate receiving means for receiving a plurality of candidates for the implantation position of said artificial tooth root on the basis of combined data to which artificial tooth data created by said artificial tooth data creating means is added; and

determining means for determining one implantation position from the candidates received by said candidate receiving means.

2.   The artificial tooth root implantation position determining instrument according to claim 1, wherein the instrument comprises mechanical evaluation factor calculating means for

calculating the mechanical evaluation factors generated in the respective vicinities by a preset occlusion force for the implantation positions respectively indicated by each of the candidates received by said candidate receiving means, and said determining means are

5   constructed so that the implantation position in which the mechanical evaluation factor calculated by said mechanical evaluation factor calculating means shows a minimum value is determined.

3.   The artificial tooth root implantation position

10   determining instrument according to claim 2, wherein said three-dimensional data relating to the jaw bone includes hardness information for said jaw bone, and said mechanical evaluation factor calculating means are constructed so that said mechanical evaluation factors are calculated on the basis of said hardness information.

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4.   An artificial tooth root implantation position determining instrument for determining the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition, the instrument comprising:

20   dentition data acquisition means for acquiring three-dimensional data relating to said dentition;

jaw bone data acquisition means for acquiring three-dimensional data relating to the jaw bone connected to said dentition;

combining means for combining the three-dimensional data

25   relating to dentition acquired by said dentition data acquisition means and the three-dimensional data relating to the jaw bone acquired by said jaw bone data acquisition means;

artificial tooth data creating means for creating artificial tooth data indicating an artificial tooth that supplements the lost

portion of said dentition indicated by the combined data for dentition and jaw bone created by said combining means;

occlusion information creating means for creating occlusion information in the artificial tooth indicated by the artificial tooth data created by said artificial tooth data creating means on the basis of said combined data; and

calculating means for calculating the implantation position of the artificial tooth root that supports said artificial tooth on the basis of the occlusion information created by said occlusion information creating means.

5. An artificial tooth root implantation position determining instrument for determining the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition, the instrument comprising:

dentition data acquisition means for acquiring three-dimensional data relating to said dentition;

jaw bone data acquisition means for acquiring three-dimensional data relating to the jaw bone connected to said dentition;

mastication information acquisition means for acquiring mastication information in said dentition;

combining means for combining the three-dimensional data relating to dentition acquired by said dentition data acquisition means and the three-dimensional data relating to the jaw bone acquired by said jaw bone data acquisition means;

artificial tooth data creating means for creating artificial tooth data indicating an artificial tooth that supplements the lost portion of said dentition indicated by the combined data for dentition and jaw bone created by said combining means;

occlusion information creating means for creating occlusion information in the artificial tooth indicated by the artificial tooth data created by said artificial tooth data creating means on the basis of said combined data and the mastication information acquired by said mastication information acquisition means; and

calculating means for calculating the implantation position of the artificial tooth root that supports said artificial tooth on the basis of the occlusion information created by said occlusion information creating means.

6.   The artificial tooth root implantation position determining instrument according to claim 4 or claim 5, wherein the instrument comprises:

candidate receiving means for receiving a plurality of candidates for the implantation position of said artificial tooth root on the basis of combined data to which the artificial tooth data created by said artificial tooth data creating means is added; and

mechanical evaluation factor calculating means for calculating the mechanical evaluation factors generated in the respective vicinities by an occlusion force indicated by occlusion information created by said occlusion information creating means for the implantation positions respectively indicated by each of the candidates received by said candidate receiving means;

and said calculating means are constructed so that the implantation position in which the mechanical evaluation factor calculated by said mechanical evaluation factor calculating means shows a minimum value is determined.

7. The artificial tooth root implantation position determining instrument according to any one of claims 1 through 6, wherein said artificial tooth data creating means are constructed so as to create said artificial tooth data on the basis of the remaining teeth in the dentition indicated by said combined data.

8. The artificial tooth root implantation position determining instrument according to claim 7, wherein said artificial tooth data creating means are constructed so that in cases where there are no remaining teeth in the dentition indicated by said combined data, said artificial tooth data is created on the basis of artificial teeth in use.

9. An artificial tooth root implantation position determining method for determining the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition using a calculating device comprising a receiving part that receives data from the outside, a storage part and a calculating part, whrein

three-dimensional data relating to said dentition and three-dimensional data relating to the jaw bone connected to said dentition are received by the receiving part;

said received three-dimensional data relating to the dentition and three-dimensional data relating to the jaw bone are stored in the storage part;

said stored three-dimensional data relating to the dentition and three-dimensional data relating to the jaw bone are combined by said calculating part;

artificial tooth data indicating an artificial tooth that supplements the lost portion of said dentition indicated by the created dentition and jaw bone combined data is created by the calculating part;

5   occlusion information in the artificial tooth indicated by the created artificial tooth data is created by the calculating part on the basis of said combined data; and

the implantation position of the artificial tooth root that supports said artificial tooth is calculated by said calculating part on 10 the basis of the created occlusion information.

10.   A guide member manufacturing device which manufactures a guide member having a guide hole that communicates with the artificial tooth root cavity in which an artificial tooth root 15 supporting an artificial tooth that supplements the lost portion of dentition is implanted, the drive comprising:

forming means for forming a member that covers the artificial tooth indicated by said artificial tooth data, and the vicinity of said artificial tooth, on the basis of combined data to which artificial 20 tooth data created by the artificial tooth root implantation position determining instrument according to any one of claims 1 through 8 is added; and

hole boring means for boring said guide hole that communicates with the implantation position determined by said 25 artificial tooth root implantation position determining instrument in the member formed by said forming means.

11.   A sensor which is mounted in a hole boring device that bores an artificial tooth root cavity in which an artificial tooth root

is implanted, and which detects the hole boring direction of said hole boring device, the sensor comprising:

detection means for detecting the hole boring direction of said hole boring device;

5 judgment means for judging whether or not the hole boring direction detected by said detection means is the boring direction of the guide hole possessed by the guide member manufactured by the guide member manufacturing device according to claim 10; and

notification means for making notification that the boring 10 direction of said boring device is erroneous in cases where it is judged by said judgment means that the boring direction is not the boring direction of said guide hole.

12. A drill mounted in a boring device, comprising 15 marks spaced at a distance from the tip end portion based on the implantation position determined by the artificial tooth root implantation position determining instrument according to any one of claims 1 through 8.

20 13. An artificial tooth manufacturing device for manufacturing an artificial tooth that supplements the lost portion of dentition, the device comprising planing means for planing an artificial tooth which has an occlusion face indicated by occlusion information and a shape indicated by artificial tooth data on the basis of the 25 artificial tooth data and occlusion information created by the artificial tooth root implantation position determining instrument according to any one of claims 4 through 8.

14.   A computer program for causing a computer to determine the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition, wherein the computer program executes:

5   a routine that causes the computer to combine acquired three-dimensional data relating to dentition and three-dimensional data relating to the jaw bone connected to said dentition;

a routine that causes the computer to create artificial tooth data indicating an artificial tooth that supplements the lost portion of

10   said dentition indicated by the created combined data relating to the dentition and jaw bone;

a routine that causes the computer to create occlusion information in the artificial tooth indicated by the created artificial tooth data on the basis of said combined data; and

15   a routine that causes the computer to calculate the implantation position of the artificial tooth root that supports said artificial tooth on the basis of the created occlusion information.

15.   A computer-readable recording medium on which a

20   computer program that is used to cause a computer to determine the implantation position of an artificial tooth root which supports an artificial tooth that supplements the lost portion of dentition is recorded, wherein the recording medium records a computer program that executes:

25   a routine that causes the computer to combine acquired three-dimensional data relating to dentition and three-dimensional data relating to the jaw bone connected to said dentition;

a routine that causes the computer to create artificial tooth data indicating an artificial tooth that supplements the lost portion of

said dentition indicated by the created combined data relating to the dentition and jaw bone;

a routine that causes the computer to create occlusion information in the artificial tooth indicated by the created artificial tooth data on the basis of said combined data; and

a routine that causes the computer to calculate the implantation position of the artificial tooth root that supports said artificial tooth on the basis of the created occlusion information.